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Integration of Blockchain with Big Data Free Schema

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ABSTRACT: Security, immutability, and nature present numerous difficulties. Big data in monetization is still among the biggest concerns for large of data set management. Large organizations easily convert unstructured data sets into structured data sets. Still the problems are faced in smart services in searching of reliable big data solutions. Security and privacy are the main concerns of cybersecurity. The main problem of integrating blockchain with big data free schema is how big data can be transferred to the blockchain model with complete assurance of privacy, security, and integrity. It requires an architectural model that paves the way to decentralized, immutable and secure data modeling. Blockchain is relatively a new technology, guaranteeing integrity and ensuring security in the field of information systems. Its first implementation is bitcoin as a crypto consensus model in which the computational evaluation of currency has gained a lot of attention. Blockchain mining and approving exchanges comprise a distributed system that contains connections. This article opens new paths into the blocks of transactions. Immutability, authentication and distributed consensus are the main characteristics of blockchain.

INDEX TERMS: big data, blockchain, integration of big data free schema, privacy, security

I. INTRODUCTION

In the past few years, the online availabilty of a huge amount of information has drawn the attention of theacademics, industry, and even governments around the world. Big data refers to the information and knowledge that cannot be managed through the existing database management tools. It comprises a huge number of structured and unstructured data sets [1]. Owing to the substantial amount of information available online, new techniques are required so that its processing and extraction becomes possible. Several problems arise due to the heterogeneous nature of properties such as volume, speed, assortment, variableness, esteem, and multifaceted of big data. Big data deals with a huge amount of data and it

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is not easy to convert unstructured data sets into structured data sets. There are multiple problems with big data, security and privacy being the main challenges. These challenges can only be solved with the help of blockchain [2]-[3]. There is a problem with big data that is how we can transfer the huge amount of data with complete assurance regarding privacy, security, and integrity. Blockchain is widely used with IoT in the development of different smart systems. "A Blockchain is a growing list of records, called blocks, which are linked using cryptography" [4].

Each block contains a cryptographic hash of the previous block, a timestamp, and transaction data (generally represented as a merkle tree root hash) [5], [6]. Block chain technology was initially used for crypto currency. It has been used for the last 3 years. Since the advantages of using this technology have become apparent, developers and researchers are striving to integrate it with other technologies. [7] Many researchers have published research papers manifesting the use of block chain technology in smart home systems, smart office systems and also smart cities [8].

Blockchain works using the above mechanism. It is the best technology to integrate in smart cities by preparing a decentralized data sharing network, so that smart homes, smart offices, and smart vehicles [9] can be interlinked. Using blockchain, the security of the data would be ensured and there would be no problem of schemas. All data would be managed using this technique [10].
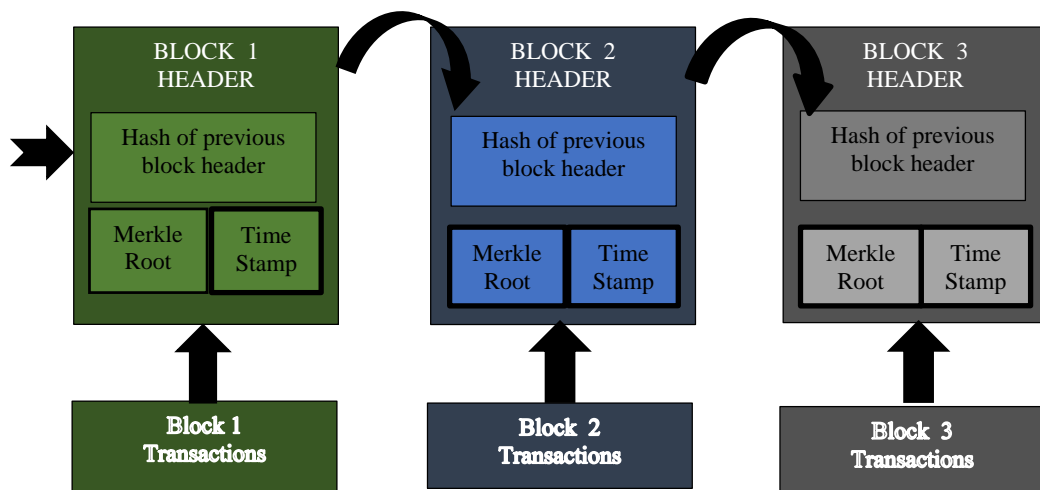

Fig.1. Basic architecture of block chain
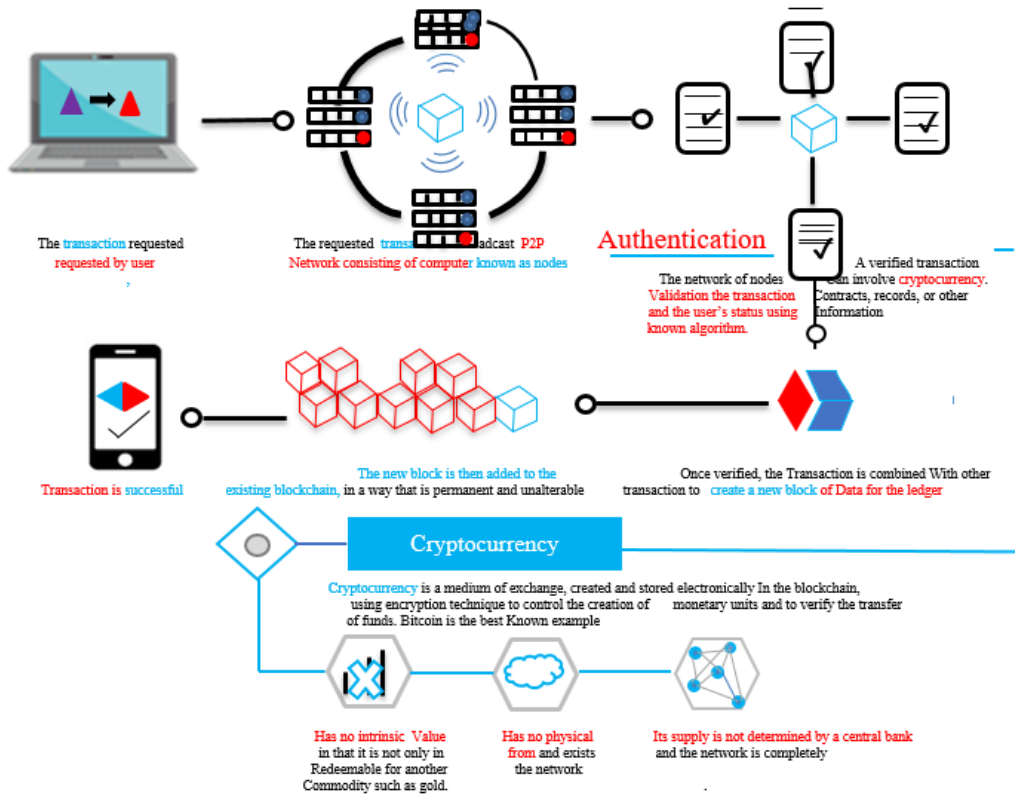
How does the blockchain work:

Fig. 2. How the blockchain works

This paper is organized in the following sections. Literature review discusses the existing and new technologies combining big data free schema and blockchain technologies. Problem statement is stated in Section V and the proposed model for the integration of blockchain with big data free schema is presented. Moreover, the pros and cons of the newly proposed model are explained. Conclusion and future directions are discussed in the last section.

II. LITERATURE REVIEW

A. Blockchain in Various Applications

Blockchain is a well-known technology for bitcoin that can be functional for outside cryptocurrencies. It allows them to complete payment without any bank or middle way. Blockchain technology is counted among famous future technologies such as smart contracts, internet interaction systems, IoT, reputing systems, public services, and security services. The

building chunks of blockchain contain various components such as standard protocols, or network components like cryptographic hashes, proof of work, and digital signature. In blockchain, stakeholders are institutions, individuals, and organizations execute a duplicate ledger for their valid entry in the list. When transactions enter into the blocks, at first they are signed digitally by the owner and then verified by the candidates who entered the earlier blocks [11]-[12].

In blockchain as a digital signature, the contributors wish to run a transaction and broadcast it over the web. This transaction is digitally signed by the owner by repeated hashing of the public key for the first authentication and then it is transmitted for confirmation by other nodes. In blockchain, smart contract is based on decentralized and secure protocols, in which there is no single authority for accountability, memory protection, and data validation. All members work for the transaction that enters into the block and then, the standard protocol helps to find the verified transaction. If standard protocol focuses on authentication, every user discovers the appropriate validation. When the applicant starts working on the validation, firstly, they check the value that makes the pool of cryptographic hash in which the block starts with 'n' number of zero. It helps to provide more securiy and a chance for the applicant to score points and gain

motivation for performing the validation scheming [13].

In standard protocol using the cryptographic hash technique, the applicants get the validation which is then transmitted to all participants and confirmed by the blockchain resulting in the cryptographic hash like SHA 256 block which serves as a cryptographic linkage to the preceding block. At the same time, the participants get multiple blocks where the largest chain is significant. Blockchain innovation provides a different way to gain trust and manage the blockchain transactions. It also provides an effective way to handle the insurance domains such as finance. It provides different facilities such as the insurance claim process and asset management. In the near future, blockchain can have major applications in smart systems in which money lending, smart cars, and smartphone facilities are provided [14].

As for blockchain engineering, it administers the Internet of Things (IoT) which has smart applications and an array of sensors. On the Internet of Health Things (IoHT) and the Internet of Medical Things (IoMT) it can be used to provide security, privacy, and successful personal treatment [4],[5],[11] For smart society, it helps to provide secure smart reports, passage surveillance, and smart health care and treatment. Blockchain engineering works as a smart administration in which the transaction of electronic

passports, births, marriages, certificates, confidential sense of belonging, and smart public service are performed.

With the passage of time the blockchain applications have grown to different ecosystems. It also helps to maintain and obtain the professional capabilities of blockchain-based distributed platforms. The authorization and verification are of utmost importance while dealing with the risk factors and threats to the networking standard transactions. To achieve successful and secure data organization, professional interest alone does not serve. The proportional representation of three factors is mandatory in the blockchain ecosphere: request, rivalry, and know-how.

The benefit of blockchain based value call forwarding system is the opportunity to make even small transactions. In the ordinary charge transaction scheme, some technical rules and fixed payments are involved that reduce the execution of payment or make transactions possible in a large area. In new business for online volume designers where clients charge for new items, videos, and other such volumes on drawn paper for nano payments. In the blockchain, due to flexible cryptocurrencies nano payment offers more frequent use cases [15].

Another blockchain capability is the vote schemes that are otherwise hard to build for the unit scope statement of impartiality in such schemes. To assure a fair election, on-line vote schemes must stay private as well as authorized but arbitrated.

In block technology according to the technical point of view it is a very smart skill in which users have the ability to select all the correct boxes. In blockchain technology, the voting system is an easy way to create a similar method such as a cryptocurrency. Since blockchain can be claimed to be innovating and dominating yet anonymous, anybody can easily prove the concerns regarding vote and also keep the ballot secure or review the vote to get into account consequently. Blockchain skills can help to reduce fabrication in politics and provide security in the elections management [16].

People who are in favor of the blockchain techniques agreed to one of the most vivid ideas to bring about the union of distributed units or blocks of data. The point is that by enrollment, cryptocurrency with self-executing smart contracts is likely to bring about a network of automatic nodes that inquire remotely as a scheme but as an administrator according to a protocol specified in computer encryption, it is mandatory in the blockchain. Another way to summarize the distributed and independent organization of data is that it is compared with another system such as robotics [17].

In an artificial system such as (robotics) people are used to establish an independent infrastruture that can perform human tasks. In today's world, independent robots perform their tasks efficiently in a distributed, but collborative environemtn to assist the users in multitasking and timely completion of the jobs. The main purpose of industrial robots is to provide the goods and services to retailers and end customer. The artificial intelligence assistance in manfucaturing, trading and supplychain form a futuristic distributed human machine business society. [18].

Blockchain is developed to get the following benefits such as real-time peer to peer action, consistency, reversibility, and distributed system. Many shortcomings or challenges linked with this technology cannot be avoided. In a centralized setup it will require more time to conform to each transaction and to get the knowledge of every block in the network [2].

Another technology of blockchain is a peer to peer network that has the features to protect the network of two nodes that use the public key of cryptography. It also illustrates reality as high level of protection is provided for its applicants. Consistency is also maintained in this system using two features validation and integrity [19]. Information is shared or stored over the network therefore it is selected as big data. In blockchain technology the data

based on programming and validation helps to reduce the operating errors. In blockchain innovation, it helps the participants to create an open and useful system where everyone participates in their plans and develops their code, and also develop their atmosphere [20]. A famous example of this type is called smart contracts in which two companies write their code that can be said to be the promised contract.[2] In blockchain technology, the solution designer of any domain can openly state any idea as private, while some solutions and documents can be shared publicly. The decision is made on organizational confidentiality vs transparency policies. The options provided in peer to peer networks by blockchain certify the correctness and privacy of data and sharing contracts.

B. Key Characteristics of Blockchain

Blockchain has the following key characteristics:

1) *Decentralization*

2) *Consistency*

3) *Anonymity*

4) *Auditability*

5) *Standard Authentication*

6) *Read permission*

7) *Immutability*

8) *Efficiency*

9) *Centralized*

10) *Agreed process*

III. CHALLENGES THAT INFLUENCE BIG DATA

As all companies want to have knowledge of their consumers' operation, big data is one of the fastest-growing sub-domain in the world. Big Data refers to large datasets that are analyzed to identify basic processes using advanced statistical models and data mining. Here's how these two big industries can benefit from each other. Several large organizations like Facebook, Amazon, and Google have large amounts of data worldwide that they want to store. These records can reach the petabyte range, but such large datasets have lot of problems also. Businesses need to ensure that the final data is synchronized in real-time between all data centers and that the data is authentic. Businesses must also make plans for malicious intruders who have access to data centers and natural disasters. The blockchain can be as accessible as it is in the core, and the blockchain are just databases with three essential properties: decentralization, immutability, and integrity

A. Decentralization

The decentralization of storage and data management helps to increase security by classifying the flow of control. In a situation where a data center employee is trying to enter or change data, decentralization ensures that there are data copies that are unaffected. In an organized attack on the database, the attacker should check a part of the network that is relatively hard to obtain. Decentralization also ensures that the management of such a model is systematic. This is done through the agreement of all involved parties who must use the model to maintain justice.

B. Data Immutability and Integrity

The immutability of the data is of paramount importance to companies working with big data. If the dataset to be examined is altered in any way, the resulting analysis has little value. Of course, organizations want to avoid this scenario to save money. Blockchain can ensure that it offers a consistent way of promoting the integrity of data and audit trails. The two main problems that companies are facing with big data are:

1) *Ensuring that data has not been modified*
2) *Ensuring that data comes from an authentic source*

C. Monetization

Another problem for large datasets is the issue of rights or property. Blocking facilitates the transfer of ownership of the data and simplifies the transfer of rights and payments based on fair use. This would allow the universal open data market that has never been seen before. People could get a fairer reward than now and organizations would have access to more data points.

D. Security

The most striking benefit of using blockchain technology as a healthcare provider for the security of large data sets is that blockchains are piracy secure. In 2015, healthcare providers lost 100 million patient records along with leading insurers due to lot of data breaches. If the data is encrypted, sealed, and, alternatively, if several blocks such as B. Factom are added, there is no unauthorized access. Doctors can get immediate access and patients have much more control over the use of their confidential information. [1].

IV. IMPLEMENTATION OF BLOCKCHAIN ON BIG DATA

Before implementation, we need to know the roots of blockchain in big data. The blockchain in big data belongs to digital art. All kind of designers, artists, and those who do creative work can easily share their work on the internet. But the main issue is to protect copyright and ownership of the work that is quite difficult. Ascribe raises the questions on this internet defect by pointing out that. how can the user, "who publishes their work online", lose the control of their ownership?

Ascribe's vision is helping to create a wall to protect the ownership right over the internet for digital information (online content). Ascribe is an internet built-in technique that has few defects related to ownership. To share any kind of multimedia data (incluing movies, videos, images, and 3d or 2d graphics) a efficient solution is still not available to solve the problems of data duplications, copyrights and privacy concerns appeared at "www" introduced hyperlinks at internet.

The concept of digital sharing was introduced because people were using another way to copy and share pictures. "Project Xanadu" was the first hyperlinked digital project which was introduced in 1960 but with time it was observed that this project was also not very helpful for people hence was closed in a very short time. Afterwards the ascribe technique, discussed above, tries to achieve the main goals of the "Xanadu" project and discover a solution for the "visibility of copies" and "digital property registry". The problem of this technique is similar to the machine learning problem. The idea behind the proposed blockchain solution is very simple. The only way out is to email the sender with a digital signature so that any intruder will not try to change the content. Timestamp and mining techniques were also introduced at that time. Ascribe technique introduced a protocol for blockchain implementation and this protocol is called "Secure Public Online Ownership Ledger- SPOOL". The purpose of this protocol is to document the transaction records which are related to digital property ownership and this protocol also guarantees that this

technique will now be reliable and authenticated.

Factom is one of the most interesting blockchain startups to solve this specific problem. Factom uses the power of the Bitcoin blockchain to confirm the immutability and validity of the data. The Factom system divides data services into smaller blocks and uses the user's network to provide security at every step. This system also makes it unnecessary to check future inconsistencies, since only hashes of the two data sets have to be compared. [1].

In this technique along a big chain of nodes,strong hashed functions are involved and this increases the security of this technique. Over time the next introduced technique related to the blockchain was "Monograph". This technique ensured that a friendly digital market value would be build with the help of "Monograph", making it easy to buy and sell fully licensed applications with good terms and conditions and affordable prices. The last implementation of blockchain is the "Bit mark" as it allows both types of transmissions, that is, with physical objects and digital objects. But here the question about the storage of the information related to a physical object like the house, computer, related card arises? A new solution for this problem which is known as "Minutiae" could be introduced. For the digital solution hashing could be used.

By using the hash function digital data could easily be stored. Therefore it could be said that the internet has lost a lot of resources but blockchain provides secure and authentic solution by using hashing and digital art. All techniques use the "bitcoin" technique and provide authenticity. But the main purpose of "Ascribe" is to buy and sell the license along with track and share. By using these techniques no organization or any person can change the private data with the help of hashing and bitcoin and making this type of security and authenticity possible. [12]

A. Stop The Tendency To Centralization

The blockchain was created as a decentralized system. The miners, however, tend to be centralized in the mining basin. So far, the top 5 mining groups together account for more than 51% of the total hash capacity in the Bitumen network [4]. Apart from that, the self-centered mining strategy showed that groups with more than 25% of total computing power receive more income than a logical stake. The rational miners have to pay attention to the selfish swimming pool, and finally, the pool can easily contain more than 51% of the total power. Because the blockchain should not provide some organizations, some methods should be considered to solve this problem.

The blockchain is well united with big data. Here the groupingis classified in two ways: data management and data

analytics. As for data management, blockchain is used to store vital data as it is spread and protected. Blockchain will also make sure the data is new. If blockchain is used to store patient's health information, the information cannot be changed and it is tough to take that private information. When it comes to data analytics, transactions on the blockchain will be used for big data analytics. For example, user swap patterns might be extracted. Users would be able to compute their potential partners' transaction behaviors with the analysis.

B. Smart Contract

The intelligent contract is an automated transaction log that executes the terms of the contract [14]. It has been designed for a long time and now this concept can be implemented with the blockchain. In the blockchain, the intelligent contract is a section of code that miners can do mechanically. At the moment, a smart contract is creating promising platforms, and thus can achieve more features. The chain of blocks could be used in many areas, such as IoT [8] and banking services [13]. We can divide intelligent contract research into two categories: development and evaluation. Development is the development of intelligent contracts and the development of intelligent contract platforms. Many intelligent contracts are planned in the ethereum blockchain [15]. Developing platforms, for example, create many development platforms for smart contracts, such as Ethereum [15] and Hawk [11]. The rating means code tests and performance evaluations. Mistakes in a smart contract can lead to terrible damage. For example, due to a recursive call error $ 60 million was misused in a smart deal: the DAO [10]. Therefore, smart contract attack research is very important. On the other hand, the implementation of intelligent contracts is also crucial for the challenges and opportunities of the blockchain: importance for intelligent contracts. With the rapid development of blockchain technology, smarter contract-based applications can be used. Companies must consider the performance of the application.

V. PROBLEM STATEMENT

The previous discussion included big data and its role in our daily lives, such as storing personal information, medical records, emails, Twitter messages from Facebook, videos, and more. The world cannot function without big data. This process is data in terabytes of petabytes. In this current age, where thousands of billions and billions of records are stored every second, a verified system is needed that guarantees at least 99% of the security of confidential data is guaranteed. Store and process with a larger data size. [11] Also, the proposed solution blockchain that has recently been used in sensitive transactions provides authenticity, high

security, and data integrity. Therefore, the problem is the transfer of the large data with evidence, privacy, security, and integrity. By integrating both models, the chain blocks, and the large data architecture, a kind of architecture can be achieved, where both models can be used. This combination of architectural architecture can solve many problems of security and integrity. [11], [12].

VI. PROPOSED MODEL

As we all know big data is XML based schema-free schema while in blockchain, data consists of nodes or blocks, and every node added to the previous node with the private key and hash function, If one node of a block is divided into two blocks like data node and schema node and these both nodes are locked in the single block like before; in this way data can be shared with free schema. Big data architecture is the one which has the data block and schema block, the schema block connects with big data architecture schema block and data block connects big data architecture data block and both are used to share and handle data.

In this proposed solution when a node of blockchain data connects with a free schema data node, every next node will authenticate and consists of a private key. Every time data needs to be shared with this integrated model data node and schema node will separately
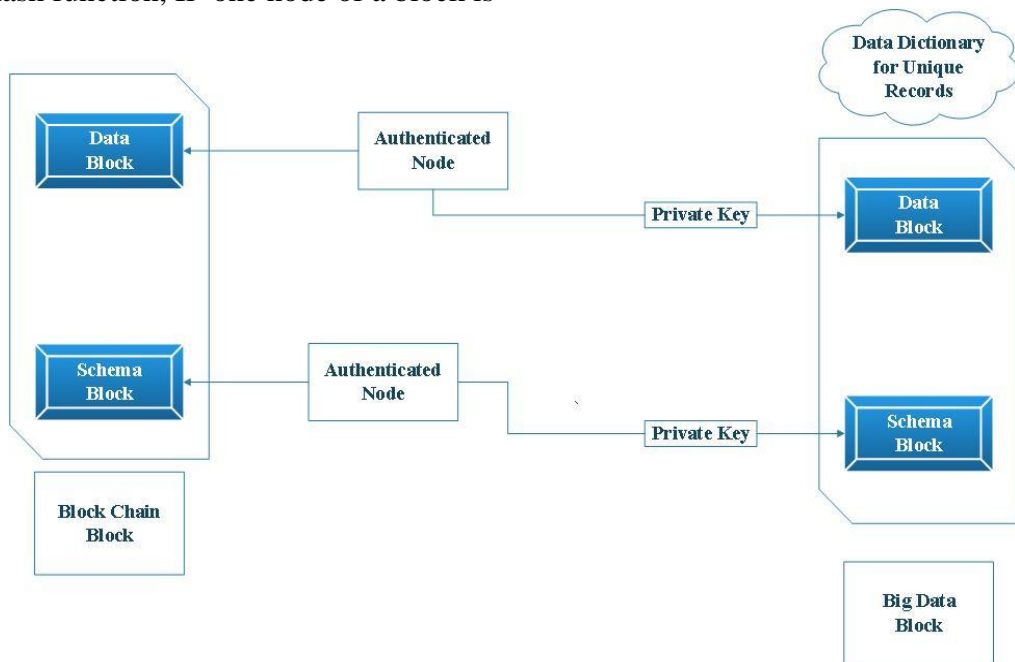

Fig. 3. Integrated new proposed model

connect in the form of blocks and with authentication data handling would start. If we have any type of record which is not handled with the data node and schema node then it will be handled through the "data dictionary". Data Dictionary is the separate file that is handled for a unique type of record which is not like schema nor like data and is also encrypted with the private key which is only known by node handlers.

VII. Pros and Cons of the Proposed Model

Firstly, if the benefits of the proposed model are discussed then its weightage is far higher as compared to any drawback of this model. If a large amount of data has to be handled this model will provide security and integrity in all fields where big data is involved like in social media websites, in any health care systems, or many more. If this solution is implemented, then like in 2030 its worth is probably 20 % to 30 % higher than our expectations. But everything which is proposed there is always a drawback of every solution and the main drawback of our proposed solution is efficiency and performance. When we handle a large amount of data within blocks and every block is authenticated then definitely its performance is slower than before and the efficiency of the proposed model is compromised. But as per the need of security and integrity today, in any sensitive data sharing then

a compromise in efficiency and performance should be tolerated. But in the future with the help of further technology, the drawback of efficiency could be tolerated [21].

VIII. Councluison & Future Directions

The blockchain has shown that this is possible in science and industry. The following five areas could be looked into: block-chain testing, stopping the centralization trend, big data analysis, smart contracts, and artificial intelligence. Currently, various kinds of square chains and more than 700 cryptographic forms of money have been registered. In any case, some developers can tailor the execution of their blockchain to attract the attention of financial specialists, driven by a tremendous advantages. When customers need to link the blockchain with the business, they also need to find out which blockchain meets their needs. The blockchain test system must be configured to test different blockchain. The block test should be described into two phases: the standardization phase and the test phase. In the standardization phase, all criteria must be developed and approved. When a blockchain is created, the agreed standards attempt to determine if the blockchain is functioning properly as an engineer's design. Test phase, the block evaluation succession test must be carried out with different standards. For example, a customer who has the duty of online

retailers thinks about the performance of the square chain, so the investigation must show that the normal time in which a customer places an invoice on the stock market in the square chain sends, should meet the capacity of the chain of blocks There are some problems with big data. Security and privacy are the main challenges of big data. These challenges can only be solved with the help of blockchain. At this point, we confirmed the possibility of using blockchain technology to handle the security and privacy process for big data through the explanation of our proposed model.The proposed model provides authenticity, high security, and the guarantee of the integrity of data. It will be very helpful in securing the sensitive data. Firstly, users could be in a position to control all of their information. The second one is that they trust the private and secure execution of the transactions. A few difficulties remain, for example, accord models, the computational expenses of mining blocks, and approving exchanges. These barriers will in the long run be overcome, opening the way for some new outcomes.

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